

THE DRAFT OF WAGONS.

By Thomas J. Edie, Secretary of the State Board of Agriculture, read before the Adams County Farmers' Association.

The draft of an ordinary wagon is more or less influenced by the following items:

1. Height of the wheels.
2. Width of the tire.
3. Angle at which the team is attached.
4. Point to which the team is attached.
5. Distance of the team from the load.
6. Position of the load in the wagon.
7. Character of the road bed.

Taking these items in the order in which we have given them, and using the results of practical experiments, we arrive at the following conclusion in each case:

THE HEIGHT OF WHEELS.

A wagon wheel passing over an obstruction brings into use the principle of leverage. The team is retarded by the obstruction as it is offered to the point of the inclined plane, and it is to be overcome by the force of the lever which is represented by the spokes of the wheel. The greater the lever, the longer the lever and the easier the obstruction is overcome, and the larger the force required to move it.

With the wagon standing upon a level floor, place a given obstruction before the hind wheel and force the wagon over it by a lift at the outer end of the front axle. The greater the height of the wheel as the leverage, then make the same test, with the same obstruction, before the front lower wheel, and note the difference in the power of required to accomplish the result. It will be noticed that the greater the difference in the diameter of the wheel, the greater the difference in the amount of force required.

The position in which the least draft is required to move a given load is when the point of draft of the horse's collar and the axis of the load may be joined by one straight line, and it has been found by dynamometer tests that when the difference in the diameters of the front and rear wheels is considerable, but no more than often found in wagons as now constructed, the draft necessary to move the wagon, when applied to the hind axle trees, is less than when it is necessary to accomplish the same result when attached to the front axle tree as 77 to 95; it being understood that the front wheel is not applied at right angles to the load, but at an angle with the load bearing equally upon both axle trees.

Admitting the truth of the theory that the load is best drawn when it enters into the problem and more or less modify the character of the wheels. This would be well to be as high as to make drawing from the surface of the ground too laborious; the front wheels must not be so large as to make the rear wheels too small, and the hind wheels too large, as any great difference in the diameters of the front and hind wheels causes blocking up on the front axle so as to keep the wagon back and load level.

THE DRAFT OF WAGONS.

The draft to which a wheel will sink into soft ground is increased by the bearing which it has upon the surface of the road; a wheel with tires three inches wide has double the bearing with the same wagon and load, possessed by one with tires only one-half inch wide. It therefore naturally follows that the wide tire will, by its weight, pull the soft road, causing the load to sink.

In an experiment made to dynamometer tests, under the care of Prof. S. A. Sanborn, it was found that a wagon, with a load of 2000 pounds, required 365 pounds and running over a fine gravel road, with wheels three inches wide, required a draft of 300 pounds; when the load was increased to 2500 pounds, the draft was increased to 430 pounds; thus showing a saving in draft of 43 per cent, in favor of the wide tire; or as Prof. Sanborn has said, "The load is drawn by the wagon to which it belongs, the broad wheels 3248 pounds of loading would be drawn as easily as 2000 on the wide tires, except the loss from the wheel cutting deeper under the heavy load."

In a second experiment, on a draft of 451 pounds, with the same load, required 441 pounds; or a saving of 12.7 per cent, in favor of the wide tire.

AT THE POINT, AT WHICH THE TEAM IS ATTACHED.

The effect of the angle of the team to different points on the wagon, has been partially illustrated above, but there are some items to which it is not worth while to call attention.

Prof. S. A. Sanborn, of the State Station, thus alludes in his report to the differences in the point of attachment to the wagon and load.

The effect of the wagon was reversed and the horses were attached to the hind wheels. In this test the load was run over an inclined plank road. By shifting the angle of draft, was narrowed, as the front wheel, when the wagon is reversed, stands nearer the height of the horse's shoulder, while the reach that connects the hind wheels with the front wheel is at an angle, the reverse of that with which the hind wheels are drawn in their natural order.

The usual inference is that with a four-horse team, attached in the usual way, the front pair have a draft and effort, while the hind pair have a draft, but that the horses, by their exertions made under the same authority as above quoted, would indicate that this is not the case.

To test the matter the four horses were attached to the end of the pole, thus of course placing them the length of one wheel from the wagon, and it was found that, when the load was reversed, yet, when the team was tested in the ordinary way, but 185 pounds of draft were required to produce the same result, as the figures show:

Draft on usual hitch, 200 lbs.
Draft on hitch and wheels, 273 lbs.

DISTANCE OF THE TEAM FROM THE WAGON.

The usual inference is that with a four-horse team, attached in the usual way, the front pair have a draft and effort, while the hind pair have a draft, but that the horses, by their exertions made under the same authority as above quoted, would indicate that this is not the case.

To test the matter the four horses were attached to the end of the pole, thus of course placing them the length of one wheel from the wagon, and it was found that, when the load was reversed, yet, when the team was tested in the ordinary way, but 185 pounds of draft were required to produce the same result, as the figures show:

Draft on usual hitch, 200 lbs.
Draft on hitch and wheels, 273 lbs.

THE DRAFT OF THE TEAM FROM THE WAGON.

In order to make a test of this point the load was evenly distributed on the front and back axle, and the resulting draft carefully noted. A load of one ton, with a load of 2000 pounds and driver exactly 3300 pounds, was evenly distributed on the front wheels of a wagon going up a hill; the draft was found to be 305 pounds (the average of three tests), and when placed on the hind wheels it was found to be but 184 pounds.

In another test on a plank road, it was found that the load was evenly distributed on the front wheel when the load was 318 pounds and when evenly distributed in the wagon, in the usual manner, it was 305 pounds. After a number of experiments it was found that the average of all indicated that the average of the load on the front axle there was a loss of 10 per cent, in favor of the hind axle, with the same load on the hind wheels, the loss of 8.8 per cent, of the draft when compared with an evenly distributed load.

THE CHARACTER OF THE ROAD BED.

It needs no argument to prove the effect of the road bed upon the amount which a team can draw, but the difference in the comparative effect of different roads is very imperfectly understood. The roads are very much in their estimates; this being the case we can best arrive at results by



COPYRIGHT 1860

Can't be found

— the equal of Dr. Pierce's Golden Medical Discovery. If other medicals of this class were like it, they'd be guaranteed. This is, if it doesn't benefit or cure, in every case for which it's recommended, you get your money back. It looks a "curious" book, but it does cure all diseases arising from a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy. Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

Height of the wheels.

Width of the tire.

Angle at which the team is attached.

Point to which the team is attached.

Distance of the team from the load.

Position of the load in the wagon.

Character of the road bed.

Taking these items in the order in which we have given them, and using the results of practical experiments, we arrive at the following conclusion in each case:

THE HEIGHT OF THE WHEELS.

A wagon wheel passing over an obstruction brings into use the principle of leverage. The team is retarded by the obstruction as it is offered to the point of the inclined plane, and it is to be overcome by the force of the lever which is represented by the spokes of the wheel.

For all Scrofulous, Skin and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is cured by it, if taken in time and given a fair trial. That's all that's asked for it—a fair trial. Then, if it doesn't help, then you're safe.

We claim it to be an unequalled remedy to purify the blood and remove all disease. We claim it to be lasting in its effects, creating a tonic effect, purifying the blood, and preventing Bilious, Typhoid and Scalp Diseases, it's a positive remedy.

Even Consumption, or Lung-scorifica, is